

IN THE CLAIMS:

Claims 1-19 have been amended herein. All of the pending claims 1 through 19 are presented below. This listing of claims will replace all prior versions and listings in the application. Please enter these claims as amended.

1. (Currently Amended) A method for connecting a solder bump of an array of solder bumps on a semiconductor device and a contact site of a plurality of conductive contact sites of a member, comprising:  
heating ~~said the~~ solder bump of ~~said the~~ array of solder bumps to a softening temperature  $T_s$   
below a melting temperature of ~~said the~~ solder bump of ~~said the~~ array of solder bumps;  
and  
contacting ~~said the~~ contact site of ~~said the~~ plurality of conductive contact sites by ~~said the~~ solder bump of ~~said the~~ array of solder bumps of ~~said the~~ semiconductor device using a pressure less than substantially 22 grams-force ~~for said solder bump and another solder bump of said array of solder bumps.~~

2. (Currently Amended) The method of claim 1, wherein ~~said the~~ melting temperature of ~~said the~~ solder bump of ~~the~~ array of solder bumps is ~~T degrees Centigrade~~  $T^{\circ}\text{C}$  higher than an ambient temperature  $T_o$ , and wherein ~~said the~~ softening temperature  $T_s$  is in the range of about  $0.5T$  to  $0.95T$  above ~~said the~~ ambient temperature  $T_o$ .

3. (Currently Amended) The method of claim 1, wherein ~~said the~~ solder bump of ~~said the~~ array of solder bumps contacts ~~said the~~ contact site of ~~said the~~ plurality of conductive contact sites at a pressure not substantially exceeding about 10 grams-force.

4. (Currently Amended) The method of claim 1, wherein ~~said the~~ solder bump of ~~said the~~ array of solder bumps contacts ~~said the~~ plurality of conductive contact sites at a pressure ~~of in in~~ in the range of about 2 to 10 grams-force.

5. (Currently Amended) The method of claim 1, wherein-~~said~~ the semiconductor device having-~~said~~ the array of solder bumps is heated by one of hot air convection and infrared radiation.

6. (Currently Amended) The method of claim 1, wherein-~~said~~ the member having ~~said~~ the plurality of conductive contact sites is heated by one of hot air convection, conduction from a heated object, and infrared radiation.

7. (Currently Amended) The method of claim 1, wherein-~~said~~ the semiconductor device and-~~said~~ the member are placed in a temperature-controlled oven for heating to-~~said~~ the softening temperature Ts.

8. (Currently Amended) The method of claim 1, wherein-~~said~~ the semiconductor device is held in a chuck, ~~said~~ the chuck being heated.

9. (Currently Amended) The method of claim 1, wherein-~~member~~ the member is held in a chuck, ~~said~~ the chuck being heated.

10. (Currently Amended) The method of claim 1, wherein-~~said~~ the member having ~~said~~ the plurality of conductive contact sites is heated by electrical resistance wires.

11. (Currently Amended) The method of claim 1, wherein-~~said~~ the member and a substrate are mounted on a mounting board having an integral heater, ~~said~~ the integral heater controlled to heat-~~said~~ the member to-~~said~~ the softening temperature Ts.

12. (Currently Amended) The method of claim 1, wherein-~~said~~ the array of solder bumps comprises Sn-Pb solder having a lead content in the range of about 40 to about

98 percent, and ~~said the~~ softening temperature  $T_s$  comprises a range of about 140 to ~~180~~ degrees ~~C~~ 180°C.

13. (Currently Amended) The method of claim 1, wherein ~~said~~ heating comprises predetermining a heating time  $X$  to heat ~~said the~~ solder bump of ~~said the~~ array of solder bumps to ~~said the~~ softening temperature  $T_s$ , and heating for ~~said the~~ time  $X$ .

14. (Currently Amended) The method of claim 1, wherein ~~said~~ heating comprises initiating ~~said the~~ heating, measuring a temperature of one of ~~a the~~ member and ~~a the~~ semiconductor ~~die device being heated~~, and stopping ~~said the~~ heating to limit ~~the a~~ temperature of ~~said the~~ solder bump of ~~said the~~ array of solder bumps to no more than ~~said the~~ softening temperature  $T_s$ .

15. (Currently Amended) An apparatus for connecting a solder ball to a contact site comprising:  
a first member having a solder ball thereon;  
a second member having a contact site;  
apparatus for moving ~~said the~~ first member against ~~said the~~ second member for contact of ~~said the~~ solder ball to ~~said the~~ contact site, ~~said the~~ first member contacting ~~said the~~ second member at a pressure less than substantially 22 grams-force for ~~said at least one the~~ solder ball; and  
heating apparatus for heating ~~said the~~ solder ball and ~~said at least one the~~ contact site to a submelting ~~solder solder~~-softening temperature  $T_s$ .

16. (Currently Amended) The apparatus of claim 15, wherein ~~said the~~ contact site comprises one of a substantially flat surface, a recess for receiving a portion of a solder ball, and a recess having at least one projection therein for deforming a solder ball inserted therein.

17. (Currently Amended) A testing apparatus for a semiconductor package having a ball grid array of solder balls on a surface thereof, ~~said the~~ apparatus comprising:  
an insert formed of generally noncompliant material, ~~said the~~ insert having a first surface including an array of contact sites for contacting ~~said the~~ ball grid array of solder balls, ~~balls~~ and having a second surface;  
a substrate having a first surface, having a second surface, ~~said the~~ second surface of ~~said the~~ insert secured to ~~said the~~ first surface of ~~said the~~ substrate, and having a pattern of leads on ~~said the~~ substrate for connecting to contact leads in a socket;  
electrical leads connecting ~~said the~~ array of contact sites of ~~said the~~ insert with ~~said the~~ pattern of leads of ~~said the~~ substrate;  
a test board having ~~said the~~ socket with ~~said the~~ contact leads connected to a testing circuit, ~~said the~~ substrate and ~~said the~~ insert for insertion into ~~said the~~ socket for contact of ~~said the~~ pattern of leads of ~~said the~~ substrate with ~~said the~~ contact leads of ~~said the~~ socket; and  
heating apparatus associated with at least one of ~~said the~~ substrate, ~~said the~~ insert, and ~~said the~~ socket.

18. (Currently Amended) The apparatus of claim 17, further comprising ~~temperature~~ ~~temperature-sensing~~ apparatus attached to one of ~~said the~~ substrate, ~~said the~~ insert, and ~~said the~~ semiconductor package.

19. (Currently Amended) The apparatus of claim 18, further comprising a temperature controller for controlling ~~said the~~ heating apparatus.